B.R.33003/252
July, 1969

BRITISH RAILWAYS

DIESEL ELECTRIC SHUNTING LOCOMOTIVES

Nos. 3000 - 4192
4500 - 4502
12033 - 12138
15211 - 15236

PART 1

LOCOMOTIVE DATA AND EQUIPMENT FITTED

	3000 - 3664 3672 - 3718 3722 - 4098 4115 - 4192	3665 - 3671 3719 - 3721 4099 - 4114	4500 - 4502	12033-12138	15211 - 15236
Wheel arrangement	0-6-0	0-6-0	0-6-0	0-6-0	0-6-0
Tractive effort	35,000 lbs.	26,000 lbs.	70,000 lbs.	35,000 lbs.	24,000 lbs.
Maximum speed	20 m.p.h.	27½ m.p.h.	20 m.p.h.	20 m.p.h.	27½ m.p.h.
Wheelbase	11ft. 6in.	11ft. 6in.	42ft. 1½in.	11ft. 6in.	11ft. 6in.
Wheel diameter	4ft. 6in.	4ft. 6in.	4ft. 6in.	4ft. 0½in.	4ft. 6in.
Overall width	8ft. 10in.	8ft. 10in.	8ft. 10in.	8ft. 11¾in.	9ft. 0in.
Length overall	29ft. 3in.	29ft. 3in.	60ft. 1in.	29ft. 1½in.	29ft. 6in
Height overall	12ft. 8⅝in.	12ft. 8⅝in.	12ft. 8⅝in.	12ft. 5½in.	12ft. 8¾in.
Minimum curve negotiable	3 chains	3 chains	3 chains	3 chains	4 chains
Fuel tank capacity					
main tank	585 gallons	585 gallons	585 gallons†	585 gallons	585 gallons
service tank	83 „	83 „	83 „ †	75 „	75 „
total	668 „	668 „	668 „ †	660 „	660 „
Weight	48-49 tons	48-49 tons	120 tons	47 tons	45 tons

†=quantities for each locomotive in coupled pairs.

This instruction supercedes instruction books B.R.33003/13, B.R.33003/23, B.R.33003/25, B.R.33003/27, B.R.33003/110 and B.R.33003/200.

PART I

LOCOMOTIVE DATA AND DESCRIPTION

The diesel electric shunting locomotive consists very simply of a diesel engine which drives a generator producing the necessary electrical power. This is fed to the traction motors which convert electrical energy into mechanical energy. There are two traction motors, but in order to increase the adhesion the six wheels are coupled.

There are fuel, lubricating oil and water systems associated with the engine. An auxiliary generator supplies the power for machines which provide compressed air and create vacuum in the brake system, and additionally charge the batteries which provide the power for lighting and starting the engine.

Engine

The diesel engine has six cylinders and develops 350-400 h. p. It is of the vertical in-line normally aspirated type. The principles of operation are fully described in "DIESEL TRACTION MANUAL FOR ENGINEMEN," 1962. Most of this type of shunting locomotive have an English Electric engine but Nos. 3137-3151, 3439-3453, 3473-3502, 3612-3651 and 4049-4094 have a Lister Blackstone engine.

The fuel required by the engine is carried in two tanks, mounted just in front of the driving cab. The lower and larger tank is the main fuel tank and the smaller one, on top, is the service tank. This tank is deliberately placed high up in order to allow the fuel to the engine to be fed by gravity. A semi-rotary hand pump is provided so that fuel can be transferred to the service tank to keep it full. An overflow pipe returns any excess fuel from the service tank back into the main tank. There is a filter between the main fuel tank and the service tank which is situated inside the engine room on the L.H. side. There is another filter between the service tank and engine "bus line" situated at the front L.H. side of the engine with a rotating handle. Excess fuel from the engine passes to two small tanks at the front of the locomotive, one behind each footstep.

For efficient working the engine has to be kept within suitable temperature limits. Water is circulated round the engine, forced by an engine-driven water pump, situated at the free end of the engine. After passing through the engine the water is piped to the thermostatic valve and the radiator. When the cooling water temperature is low the thermostatic valve diverts it back to the pump without passing through the radiator, otherwise it passes through the radiator for cooling and then back to the pump. The cab heating system is connected to the engine cooling system and is controlled by a valve in the cab.

The engine lubricating oil has two functions:-

(a) To lubricate and cool the moving parts of the engine.

(b) To control the engine speed by operating the engine speed governor.

The engine sump acts as a reservoir for the lubricating oil which is forced round the engine by a gear-driven pump at the free end of the engine. It first passes to the radiator where it is cooled, then through a duplex strainer situated on the left hand side of the engine. If the oil is cool enough a differential valve diverts the oil direct to the strainer, by-passing the radiator. The oil is then fed to the engine governor and various parts of the engine. In the English Electric engine the oil pressure is normally about 20 p.s.i. except that supplied to the engine valve gear where the pressure is reduced to 5 p.s.i. The Lister Blackstone engine oil pressure is 35-40 p.s.i. A high pressure relief valve allows any excess pressure to be relieved and the oil to pass back to the sump. After lubricating the engine or operating the governor the oil drains back to the sump. It is essential to prime the lubricating oil system when starting the engine; a semi-rotary hand pump is provided.

The above description applies primarily to the English Electric engine but the Lister Blackstone engine is largely similar. In the fuel system the filter in the supply line is fitted on the front of the free end of the engine and the waste tank is situated on the left hand side near floor level. The principal difference in the cooling water system is the substitution of a mixing valve for the by-pass valve. This is servo operated by engine lubricating oil to control the degree of mixing of cooled and uncooled water so that a constant temperature is maintained.

Main generator and traction motors

The main generator is the source of electrical energy and is fixed directly on to the engine. It produces the high voltage direct current required by the two traction motors normally connected in parallel and geared by a double reduction gear to the leading and trailing axles. The traction motors are air cooled by a blower, which is either belt driven or motor driven.

The current required is highest at starting and during acceleration: as the locomotive speed increases the current falls and it is necessary to vary the generator output according to the speed and torque required. This is done by two methods:-

(1) Altering the strength of the generator field, by taking out or inserting resistance in series with the generator field.

(2) Altering the speed of rotation of the diesel engine.

When starting the diesel engine the main generator is used as a series motor supplied from the battery.

Auxiliary generator

This machine is either mounted above the main generator and belt-driven, or fitted directly on to the main generator, and uses an automatic voltage regulator to produce a constant voltage at either 90 volts or 110 volts for the following:-

(1) Control equipment
(2) Main generator field windings
(3) Compressors and exhausters
(4) Battery charging
(5) Lighting and cooker circuits

The following locomotives have a 110 volt control system:-
3612-3651, 3665-3671, 3687-3708, 3719-3721, 3807-3822, 3906-3936, 3998-4027, 4040-4192 and 4500-4502.
The remainder have a 90 volt control system.

Battery

The battery is used to supply power for starting the engine and lights when the engine is not running. The battery is fitted into two compartments, one on each side of the locomotive. In each battery box there is a battery switch which isolates the battery from all circuits except those for lighting.

Control system

The locomotive is controlled from a driving desk in the driving compartment. The driving controls are duplicated so that the locomotive can be driven from either side. The master controller contains three groups of cam operated switches: these are the master switch group, the reversing group, and the power control group.

The function of each group is:-

(a) Master switch group—this is for switching on the control circuits and additionally controls the starting of the engine. This group is operated by one removable master switch handle.

(b) Reversing group—this controls the direction of the locomotive and can be operated by either of the two reversing handles.

(c) Power control group—this regulates the strength of the generator field and is operated by either of the power controller handles, which also control the engine speed, so that the power of the locomotive can be regulated.

These controls are interlocked in the following manner:-

1. The master switch handle can only be removed when the master switch is in the OFF position. The reversing handle and power controller handles are locked in the OFF position when the master switch is OFF.
2. The master switch handle can only be moved to another position when both the reversing and power controllers are in the OFF position.
3. The reversing handles can only be moved to another position when the master switch is in the ON position and the power controller is at the OFF position.
4. The power control handle can be moved when:-

(a) the master switch is in the EO position and the reversing controller is in the OFF position,

or

(b) the master switch is in the ON position and the reversing handle is at FOR or REV.

An air pressure switch is incorporated in the control circuits to cut off power from the traction motors in the event of an air system failure or D.S.D. application set to open at 30 p.s.i. when pressure is falling and close at 45 p.s.i. as the pressure rises. The corresponding pressure on dual auto-air braked locomotives are 42½ p.s.i. and 57½ p.s.i. In addition dual auto-air braked locomotives have a governor in the vacuum brake pipe which cuts off power when the vacuum falls below 12½in. Hg; power cannot be restored until 15in. Hg is recreated.

Locomotives Nos. 3137-3152, 3439-3453, 3473-3502, 3612-3651 and 4049-4094 have G.E.C. electrical equipment and all others have E.E. equipment.

Brake System

The brakes on the locomotive are air operated, whether working a vacuum braked train or unbraked train. Some locomotives are being converted to work air braked trains, having the additional equipment incorporated into the existing brake system. Vacuum exhausters are fitted to Nos. 3000-3091, 3102-4192 and 4500-4502. Some locomotives only have one exhauster. The exhausters are mounted above the frames in separate compartments, one on each side when two are fitted, near the front footsteps.

The brakes are controlled by the use of one of two brake valves in the driving cab:-

(i) Straight air brake valve — used when working unfitted trains or shunting

(ii) Driver's brake valve (vacuum air-braked locomotives) — used when working vacuum braked trains

or

(iii) Driver's automatic air brake valve (dual auto-air braked locomotives only) — used when working braked trains:-
(1) air braked
(2) vacuum braked

A further brake valve is fitted on dual auto-air braked locomotives for emergency braking. All these brake valves can be operated from either side of the cab. There is also a hand brake for parking the locomotive.

Air is compressed to 85 lbs./sq. in. (100 lbs./sq. in. on dual auto-air braked locomotives) by compressors. For vacuum air braked locomotives the compressor fitted is situated under the front end just in front of the leading axle (Nos. 12033-12048 have a belt-driven compressor adjacent to the auxiliary generator above the main generator). The additional compressor for the dual auto-air braked locomotives is placed in a compartment adjacent to the generator compartment.

On vacuum/air braked locomotives the straight air brake admits air to brake cylinders up to a maximum pressure of 60 lbs./sq. in. depending on the degree of movement of the brake handle. A quick release valve installed in brake cylinder pipe allows a speedier release by venting the brake cylinders to atmosphere. This valve is inoperative during a partial release. In an emergency application the air pressure in the brake cylinders builds up to a maximum of 85 lbs./sq. in.

When working with only the straight air brake in use the exhausters are switched off. In the event of a D.S.D. application the brake cylinder pressure will be 15 p.s.i. less than the main reservoir pressure (i.e. brake cylinder pressure will be 50-70 p.s.i.).

In order to use the vacuum brake the exhausters must be switched on. When making a vacuum brake application the air brakes on the locomotive are proportionally controlled and synchronised with the brake application on the train. When making a release the exhausters can be speeded up for a quicker release of the brakes. At the completion of vacuum brake working the vacuum is released from the vacuum chamber side of the proportional valve by means of a release valve fitted in the cab.

On locomotives fitted for dual auto-air braking a switch is provided to start the second compressor. The driver's automatic brake valve controls the air brake on the locomotive and train. When working air braked trains the exhausters are not in use. Maximum brake cylinder pressure is 57-63 lbs./sq. in. for all brake applications except the emergency straight air brake which is 70 p.s.i.

0.6.0. + 0.6.0. shunting locomotives

The 0.6.0. + 0.6.0. double shunters are used for hump shunting. The "master" unit has the driving cab and controls which also operate the "slave" unit which has no cab. Special equipment includes lights in the cab to indicate that engine of the slave unit is running and warning of high water or lubricating oil temperatures on its engine. The slave unit engine is controlled pneumatically from the driving cab. Two exhausters are fitted, both on the "master" unit. One is always running whilst the engine runs and the other may be switched on as required. Other connections are provided for the air and vacuum brake system and should there be a break-away the brakes are automatically applied on both the master and slave units. To enable the sanding valves to be used on the slave unit EP valves have been fitted to enable them to be operated from the driving cab. There is also an additional ammeter in the driving cab indicating the main generator current on the slave unit. The series parallel switch in the driving cab controls both units.

Additional equipment is fitted for special hump signalling and radio telephone communication. No instructions are contained in this book for these equipments.

The master locomotive may be used as a single locomotive with the slave unit detached.

Air and Vacuum Connections

(a) Vacuum/air braked locomotives

1. 2in. vacuum hose.

(b) Dual auto-air braked locomotives

1. 2in. vacuum hose.
2. ¾in. main reservoir equalising hoses (2).
3. 1in. air brake pipe.

These connections are fitted at both ends of the locomotive:-

(c) 0.6.0. + 0.6.0 4500-4502)

1. 2in. vacuum hose.
 This connection is fitted at both ends. The following connections are made between the master and slave units only:-
2. ¾in. main reservoir equalising hose, with isolating cocks (1).
3. ¾in. engine control air pipe, with isolating cocks (1).
4. 2in. vacuum hose (1).
5. ¾in. air brake pipe (1).

Isolating Cocks

(a) **All locomotives:**

1. Fuel cock	—	situated outside L.H. front window or below platform L.H. side
2. Fuel stop valve	—	situated below platform L.H. side
3. Compressor governor	—	situated below compressor governor
4. Whistle	—	situated in driving compartment
5. Sanding	—	situated in driving compartment

(b) Dual auto-air braked locomotives: (additional to above)

6. Main reservoir pipe	—	2 at each end of the locomotive
7. Air brake pipe	—	1 at each end of the locomotive
8. Automatic air brake valve	—	situated in driving compartment (R.H. side in front of seat)

(c) 4500-4502

9. 2in. vacuum brake pipe	—	situated adjacent vacuum emergency valve in cab unit

Release Valves and Cocks

1. Vacuum chamber release valve	—	situated in cab
2. Brake cylinder release cock	—	situated between the brake cylinders or behind the R.H. cab steps

Meters and Gauges fitted

(a) In the cab:

1. Battery ammeter.
2. Main generator ammeter.
3. Speedometer (some locomotives have a second speedometer for slow speed working).
4. Engine cooling water temperature gauge (on some locomotives an audible warning is fitted instead of the gauge).
5. Engine lubricating oil pressure gauge (situated in the engine compartment on some locomotives).

6. Duplex air pressure gauge (main reservoir and brake cylinder pressure).
7. Air brake pipe pressure gauge (dual auto-air braked locomotives only).
8. Duplex vacuum gauge (except locomotives not fitted with exhausters).
9. Service tank fuel gauge.

(b) External:

1. Main fuel gauge (R.H. side only).
2. Water level gauge glass (R.H. side of radiator).
3. Mileage recorder (where fitted).

Governors (air system, lubricating oil system)

(a) All Locomotives.

1. Compressor governor — situated in engine room (R.H. side)
2. Control circuit governor (vacuum air braked locomotives only) — situated in control cubicle
3. Lubricating oil pressure (Lister-Blackstone engine only) — situated on the free end of the engine

(b) Dual auto air braked locomotives.

4. Air brake pipe governor — situated in engine room (R.H. side behind battery box)
5. Vacuum control governor — situated in engine room (R.H. side behind battery box)

Indicator lights in driving cab

(0.6.0. + 0.6.0. 4500-4502 only)

1. Engine running light (indicates that the engine of the slave unit is running).
2. High water or lubricating oil temperature light (indicates conditions on slave unit only).
3. Hump signal repeater (see separate instructions).

Controls in the driving compartment

1. Master switch with removable handle (R.H. side only).
 Marked positions — OFF
 ON
 EO (Engine only)
 START (Spring loaded to return to EO position)

2. Reversing controller (one each side of the control desk).
 Marked positions — FOR (Forward)
 OFF
 REV (Reverse)
3. Power controller (one each side of the control desk).
 Marked positions — OFF, 1, 2, 3, 4
 (4500-4502 have 14 notch positions).
4. Straight air brake valve (duplicate controls) with RELEASE, FULL SERVICE and EMERGENCY positions. (N.B. These positions are not marked on the brake valve).
5. Vacuum brake valve (duplicate controls) marked RELEASE, ON and EMERGENCY. A trigger is depressed to speed up exhauster(s) when the brake handle is in the RELEASE position. (This brake valve is not fitted to dual auto-air braked locomotives).
6. Automatic air brake valve (duplicate controls) marked RELEASE, RUNNING, FIRST APPLICATION, FULL SERVICE and EMERGENCY. A trigger is depressed to speed up exhausters when the brake handle is in the RELEASE position. (This brake valve is fitted only to dual auto-air braked locomotives).
7. Combined air/vacuum emergency brake valve (duplicate controls). This brake valve makes an emergency brake application only. (Fitted to dual auto-air braked locomotives only).
8. D.S.D. foot pedals (one each side of the control desk).
9. Hand brake.
10. Exhauster isolating switch:-
 Marked OFF, ON (vacuum air braked locomotives),
 marked OFF, NORMAL (dual auto-air braked locomotives).
11. Exhauster switch (4500-4502 only)—starts second exhauster when required.
12. Goods/Passenger switch (brake selector):-
 Marked AIR, LIGHT LOCO VACUUM (dual auto-air braked locomotives only).
13. Series/parallel changeover switch.
14. Whistle control.
15. Sanding valves.
16. Fuel transfer pump.
17. Lighting switches.
18. Cab heating control valve.

Fire equipment

Four hand extinguishers are carried in the driving compartment.

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July, 1969

BRITISH RAILWAYS

DIESEL ELECTRIC SHUNTING LOCOMOTIVES

Nos. 3000 - 4192
4500 - 4502
12033 - 12138
15211 - 15236

PART 2

DRIVING INSTRUCTIONS, INCLUDING PREPARATION AND DISPOSAL DUTIES

PART II

DRIVING INSTRUCTIONS, INCLUDING PREPARATION AND DISPOSAL DUTIES

Driver's Daily Duties when in Service

1. Check oil level in diesel engine sump.
 (This must be done either before the engine has been started or not less than 5 minutes after the engine has been shut down).
2. Check water level in radiator.
3. Check quantity of fuel oil in main and service tanks. Fill service tank with hand transfer pump once each shift.
4. Turn handles of FUEL filters one complete turn every 8 hours.
5. Blow down compressed air reservoir once every 8 hours and empty waste tank.
6. Lubricate all axle box guides, coupling rods, buffer rams, hand brake column and rotating arm slide and sleeve of mechanical drive to speedometer gearbox, where fitted, once in 24 hours.
7. Examine and, if necessary, fill sand boxes. Check operation of the sanding gear once in 24 hours.
8. Inspect lubricating oil, fuel oil and water systems for leakage.
9. Examine brakes and brake gear.
10. Check that detonators, etc., are complete.
11. Check that the fire fighting equipment is intact.
12. Make a short inspection of the locomotive and equipment at a convenient time and check that the apparatus generally is in good working condition.
13. Report all known defects at the end of each shift.

NOTE : 1-9, 12 and 13 apply to the slave unit in addition to the master unit on locomotives. Nos. 4500-2. The service fuel tank of the slave unit is filled by an electric pump controlled by a switch in the driving cab.

Colour Identification of Pipes

Cooling Water	French Blue
Fuel Oil	Light Brown
Lubricating Oil	Salmon Pink
Compressed air	White AC
Vacuum	White AV
Engine air intake pipe	White
Electrical conduits	Light Orange
Drains	Black

STANDARD FULL PREPARATION DUTIES FOR A DIESEL ELECTRIC SHUNTING LOCOMOTIVE WHICH HAS BEEN STABLED FOR MORE THAN 24 HOURS, OR AFTER MAINTENANCE

1. Unlock cab door, enter and check handbrake is " ON."
2. Check quantity of fuel oil in main and service tanks, and fill service tank if necessary.
3. Check that the detonator case and fire-fighting equipment is intact and that the exhauster switch (where provided) is " OFF." Ensure that the AIR/VACUUM switch is in the LIGHT LOCO position.
4. Check that the master controller and reversing handle are " OFF " and that the series/parallel switch, where provided, is in the parallel position. Switch on engine room lights before leaving footplate.
5. Leave cab R.H. side, proceed to front of locomotive, close battery isolating switch, examine sandboxes and close air reservoir cock on same side. Check marker lights.
6. Check radiator water level and examine engine room on R.H. side.
7. Proceed to L.H. side and close battery isolating switch and examine sandboxes.
8. Close air reservoir cock left-hand side. Open radiator shutters from floor level. Mount framing, open engine room doors and visually check that fan belts are in position. Turn handle of fuel oil filter one complete turn. Check engine sump oil level. Check oil and fuel systems for leakage and see that fuel supply valve from service tank is open.
9. Operate engine lubricating oil priming pump and start engine. (See page 11).
10. Obtain oil bottle from tool cupboard.
11. Fill coupling rod oil cups, lubricate axlebox guides, buffer rams and speedometer drive. Make a cursory examination for mechanical defects.
12. Return to cab, stow oil bottle. When the main reservoir air pressure has built up to 65-85 lbs./sq. in. (85-100 lb./sq. in. dual auto-air braked locomotives) test brakes and driver's safety device. (Vacuum brakes or automatic air brakes need not be tested unless the turn of duty necessitates the use of either brake system).
13. Check lubricating oil pressure, check the sanding gear for operation (open front and back sand valves for a few seconds and examine rails for evidence of sand).
14. Switch on appropriate electric head and tail lights.

NOTE : 2, 5, 6, 7, 8 and 11 apply to the slave units of 4500-4502.

STANDARD PART PREPARATION DUTIES FOR A DIESEL ELECTRIC SHUNTING LOCOMOTIVE WHICH HAS BEEN STABLED FOR LESS THAN 24 HOURS

1. Unlock cab door, enter and check that the handbrake is "ON."
2. Check that the detonator case and fire-fighting equipment is intact and that the exhauster switch (where provided) is "OFF."
3. Check that the series/parallel switch, where provided, is in the parallel position.
4. Operate engine lubricating oil priming pump and start engine (See below).
5. Test brakes and driver's safety device when the main air reservoir air pressure has built up to 65-85 lbs./sq. in. (85-100 lbs./sq. in. dual auto-air braked locomotives).
 (Vacuum brakes or automatic air brakes need not be tested unless the turn of duty necessitates the use of either brake system).
6. Check lubricating oil pressure.
7. Switch on appropriate electric head and tail lights.

STARTING THE ENGINE

3000-3136, 3167-3438, 3459-3472, 3503-3611, 3652-4048, 4095-4192, 4500-4502, 12033-12138

1. Close the battery isolating switches.
2. Insert the key into the master switch and turn to the EO position.
3. Operate the lubricating oil hand pump until a slight pressure is recorded on the oil pressure gauge (not applicable to 4500-4502).
4. Turn the key to the START position and release when the engine fires.

 Under no circumstances must the Master Switch be kept in the START position if the diesel engine fails to start. If the engine turns, but does not fire almost immediately, and no cause is apparent to the driver, the matter must be reported.
5. Check oil pressure gauge; it should register at least 15 lbs./sq. in.

 NOTE : On locomotives 4500-4502 the "engine running" light will indicate that the slave unit diesel engine has started.

 If the engine of the slave unit does not start place all controls in the driving cab to OFF position and remove the master key.

 Open the top section of the slave unit control cubicle and check that the master switch is in the ON position. If not insert the master switch key and move the switch to ON position. Remove the key, close the cubicle and return to the driving cab to obtain control of the units.
6. The engine can be started without using the lubricating oil hand pump if the shut-down period has been of short duration.

15211-15236

1. Close the battery isolating switch.
2. Insert the key into the master switch and turn to the START position. A motor driven pump primes the oil system to 7 lbs./sq. in. and the main generator will then motor the engine until it fires.

 Release the key when the engine starts.

 In cold weather the lubricating oil priming hand pump must be used to prime the system up to 15 lbs./sq. in.

 The engine should then be started as above.

 Under no circumstances must the Master Switch be kept in the START position if the diesel engine fails to start. If the engine turns, but does not fire almost immediately, and no cause is apparent to the driver, the matter must be reported.
3. Check oil pressure gauge; it should register at least 15 lbs./sq. in.
4. The engine can be started without the need to use the lubricating oil hand pump if the shut-down period has been of short duration.

3137-3151, 3439-3454, 3473-3502, 3612-3651, 4049-4094

1. Close the battery isolating switches.
2. Insert Master Key into the Key switch on the control desk. Operate the lubricating oil hand priming pump until a pressure of 25 lbs./sq. in. is recorded on the oil pressure gauge, then move the Master Key switch to the "START" position and hold in this position until the engine fires. Move the Key switch to "E.O." position. In this position the Main Controller may be moved to speed up the engine for warming up, as required. DO NOT "RACE" THE ENGINE.

 Under no circumstances must the Master Switch be kept in the START position if the diesel engine fails to start. If the engine turns, but does not fire almost immediately, and no cause is apparent to the driver, the matter must be reported.
3. With the engine running, check oil pressure gauge in the cab. It should not register less than 25 lbs./sq. in.: normal oil pressure is 35-40 lbs./sq. in.

TO STOP THE ENGINE

3000-3136, 3167-3438, 3454-3472, 3503-3611, 3652-4048, 4095-4192, 4500-4502, 12033-12138, 15211-15236

1. Return the reversing handle to the OFF position.
2. Move the Master Key switch to the OFF position.

 If, through a fault, the engine continues to run, pull down to the bottom position the fuel rack lever by the governor to cut off the fuel supply.

1. Return the reversing handle to the OFF position.
2. Move the master key switch to the OFF position.

 If, through a fault, the engine continues to run and cannot be stopped by normal means, press the " red " button on top of the cubicle and hold down until the engine stops. If this fails to stop the engine place the engine control lever on the front end of the engine to the " clockwise " position until the engine stops.

 NOTE : Whenever an engine is stopped by other than normal method the engine MUST NOT be restarted until maintenance staff have attended to the fault.

BRAKE TESTS

Before testing the brakes ensure that the main reservoir pressure is at least 65 p.s.i. (vacuum air braked locomotives) or 85 p.s.i. (dual auto-air brake locomotives). The master key must be in the ON position (unless otherwise stated). The handbrake should be ON.

Vacuum Air Braked Locomotives

1. Straight air brake.

 Make a FULL SERVICE application. The brake cylinder pressure should rise to 57-63 p.s.i. Move the brake handle to the EMERGENCY position and brake cylinder pressure should be equal to the main reservoir pressure at the time of application (65-85 p.s.i.). Release the brake and check that the brake cylinder pressure falls to zero.

2. Vacuum brake.

 Place the vacuum exhauster switch in the ON position. (Start the second exhauster on locomotives 4500-4502). With the vacuum brake handle at the RUNNING position check that 21in. Hg is registered by the vacuum gauge.

 Move the brake handle to the ON position. Check that the vacuum falls to zero and the brake cylinder pressure rises to 57-63 p.s.i. Release the brake and check that vacuum is recreated to 21in. Hg and the brake cylinder pressure falls to zero.

 Make an EMERGENCY application with the vacuum brake handle and check that the vacuum falls to zero. The brake cylinder pressure should be equal to the main reservoir pressure at the time of the application (65-85 p.s.i.). Release the brake and check that vacuum is recreated to 21in. Hg and the brake cylinder pressure falls to zero.

 Return the vacuum exhauster isolating switch to OFF (stop the second exhauster on locomotives 4500-4502) and release the vacuum from the reservoir by operating the release valve (except locomotives 4500-4502).

3. Driver's Safety Device.

 Depress the foot pedal and move the reversing handle to either the FORWARD or REVERSE positions.

Release the pedal. After a short interval (5-7 seconds) the brake cylinder pressure will rise to 50-70 p.s.i. (i.e. 15 p.s.i. less than the main reservoir pressure at the time of application).

Depress the D.S.D. pedal and the brake cylinder pressure will fall to zero. Make an emergency application with the straight air brake, followed by a release.

Return the reversing handle to the OFF position.

Dual auto-air brake locomotives

1. Straight air brake.

 Make a FULL SERVICE application. The brake cylinder pressure should rise to 57-63 p.s.i. Release the brake and check that the brake cylinder pressure falls to zero.

 Make an EMERGENCY application. The brake cylinder pressure will rise immediately to 70 p.s.i. Release the brake and check that the brake cylinder pressure falls to zero.

2. Automatic air brake.

 Check that the exhauster isolating switch is in the OFF position and operate the vacuum release valve to ensure that there is no vacuum in the reservoir. Start the second compressor by moving the air/vacuum switch to the AIR position. Ensure that the straight air brake valve is in the OFF position.

 Place the automatic air brake valve in the RUNNING position and check that the air brake pipe charges to 70 p.s.i. Move the brake handle to the FULL SERVICE position and check that the air brake pipe pressure falls to 48 p.s.i. and the brake cylinder pressure rises to 57-63 p.s.i. Return the brake handle to the RELEASE position and check that the air brake pipe recharges to 75-77 p.s.i. and the brake cylinder pressure falls to zero. Return the brake handle to the RUNNING position and check that the air brake pipe pressure falls slowly to 70 p.s.i.

 Make an EMERGENCY application and check that the air brake pipe pressure falls to zero and brake cylinder pressure rises rapidly to 57-63 p.s.i. Return the automatic air brake handle to the RUNNING position and check that the air brake pipe pressure rises to 70 p.s.i. and the brake cylinder pressure falls to zero.

 Move the air/vacuum switch to the LIGHT LOCO. position (or VACUUM position if the vacuum brake is to be tested).

3. Vacuum brake.

 Place the vacuum exhauster isolating switch in the NORMAL position. With the automatic brake valve handle in the RUNNING position. Check that vacuum is created to 21in. Hg (air brake pipe pressure 70 p.s.i.).

 Move the brake handle to the FULL SERVICE position and check that the vacuum falls to zero (air brake pipe pressure 48 p.s.i.) and brake cylinder pressure rises to 57-63 p.s.i. Release the brake and check that vacuum is recreated to 21in. Hg (air brake pipe pressure 70 p.s.i.) and the brake cylinder pressure falls to zero.

 Make an emergency application and check that the vacuum falls to zero (air brake pipe pressure falls to zero) and the brake cylinder pressure rises to 57-63 p.s.i.

4. Driver's Safety Device.

 Depress the foot pedal and move the reversing handle to either the FORWARD or REVERSE positions.

 Release the pedal. After a short interval (5-7 seconds) the brake cylinder pressure will rise to 57-63 p.s.i.

 Depress the D.S.D. pedal and the brake cylinder pressure will fall to zero. Make an emergency application with the straight air brake, followed by a release.

 Return the reversing handle to the OFF position.

5. Combined air/vacuum emergency brake valve.

 With either the straight air brake, vacuum or automatic air brake in use make an emergency brake. The brake cylinder pressure will immediately rise to 57-63 p.s.i. and the air brake pipe pressure fall to zero (vacuum will be destroyed if the vacuum brake is in use).

MOVING THE LOCOMOTIVE

Running with the radiator ahead is a "FORWARD" movement; with the cab ahead is a "REVERSE" movement.

1. After starting the engine hold the locomotive on the straight air brake and release the hand brake. (4500-4502 ensure that the hand brake on the slave unit has been released).
2. Move the master switch to the ON position.
3. Select the braking required:-

Type of train	Locomotive type	Brake valve to be used	Position of Goods/Passenger switch	Position of exhauster switch
Light Loco.	vacuum/air	straight air	—	OFF
	dual auto air	straight air	LIGHT LOCO	OFF
Shunting	vacuum/air	straight air	—	OFF
	dual auto air	straight air	LIGHT LOCO	OFF
Automatic air braked	dual auto air	automatic air	AIR	OFF
Vacuum braked	vacuum/air	driver's brake valve	—	ON
	dual auto air	automatic air	VACUUM	NORMAL

When changing braking systems work to the instructions headed BRAKE INSTRUCTIONS.

4. Depress the D.S.D. pedal and move the reversing handle to either the FORWARD or REVERSE position as required.
5. Release the straight air brake and operate the master controller as shown in item 6.

6. Move the master controller handle to notch 1, pausing slightly to allow the motor contactors to close. Advance the controller handle steadily towards notch 2, observing the ammeter reading which should not exceed 800 amperes, except momentarily during initial acceleration. The locomotive will progressively accelerate as the controller handle is moved towards notch 4. If the current remains in excess of 800 amperes the controller handle must be returned to notch 1 immediately. If the current remains above 800 amperes when in notch 1, with the brakes fully released, it is probable that the load is excessive. In these circumstances the load must be reduced.

Moving the controller handle between notch 2 and notch 3 increases the engine speed and more power will become available. If more power is required move the controller handle to notch 4. Provided track and load conditions are suitable the extra power will be automatically controlled.

When the locomotive is moving the maximum current should not exceed 600 amperes for other than very short periods.

Whether under POWER or COASTING the maximum speed of the locomotive (see data section) must never be exceeded.

DO NOT MOVE THE REVERSING HANDLE WHEN THE LOCOMOTIVE IS MOVING.

Provided the current and locomotive speed do not exceed the above limits the controller may remain in notch 4 for as long as required. The power output will vary automatically as running conditions vary.

The controller should be moved entirely by the feel of the train; do not attempt to drive in specific notch positions. Between notch 2 and 3 any variation in power requirement can be made.

During running, when overloading is indicated by either a fall in current or reduction in engine speed, return the controller handle to the notch 1 position. The controller may then be moved back towards notch 3 or notch 4 until the required conditions of power and speed are once more obtained.

If wheelslip should occur, return the controller handle to the OFF position, apply sand for a few seconds and then notch up again. DO NOT apply sand with the controller in a notch position or whilst the wheels are still slipping.

N.B. On locomotives 4500-4502 sanding acts on both master and slave units.

If it is desired to reduce the power progressively, such as during hump shunting, move the controller handle slowly back to notch 1. DO NOT apply the brake until the controller has been moved to the OFF position. Ensure that the brakes are released before re-applying power.

If the driver's safety device pedal is released when the master controller is in a power notch position, power is automatically cut off and after a delay of 5-7 seconds an emergency brake application is made. The diesel engine continues to run.

To reset the driver's safety device take the following action:-

(a) Return the controller handle to the OFF position.

(b) Depress the driver's safety device pedal.

(c) Make an emergency straight air brake application followed by a release.

7. When working heavy trains up steep gradients, e.g. hump yards, it may be necessary to connect the traction motors in series.

The SERIES position should only be used when authorised by the appropriate DIVISIONAL MANAGER.

The normal procedure if series connections are required will be: With the locomotive at rest, place the Series/Parallel Changeover switch into the SERIES position before starting to shunt.

THE SERIES/PARALLEL SWITCH MUST NOT BE OPERATED UNTIL THE MASTER CONTROLLER IS IN THE "OFF" POSITION, THE LOCOMOTIVE STATIONARY AND THE REVERSER AT "OFF."

At the completion of each shunt, the Series/Parallel switch must be returned to the PARALLEL position before commencing the run-round.

When in series the maximum speed of the locomotive should not exceed 10 m.p.h. with the controller in a power notch, and the main ammeter readings should not normally exceed 400 amps. except for momentary kicks up to 450 amps.

For ALL other duties, and when stabling the locomotive, this switch must be in the PARALLEL position.

8. To stop the locomotive.

1. Return the controller to OFF.

2. Apply brake.

BRAKE INSTRUCTIONS

1. When working light or unbraked trains the vacuum exhauster MUST NOT be in use (except locomotives 4500-4502, on which one exhauster is always in use) and the brakes must be controlled by the STRAIGHT AIR BRAKE VALVE only.

2. When working vacuum braked trains the following instructions apply:-

1. Vacuum/air braked locomotives.

(a) Place the vacuum exhauster switch to the ON position (on locomotives 4500-4502 the second exhauster will start).

(b) Check that the air brake valve is in the OFF position and the vacuum brake valve in the RUNNING position. Check that 21 inches of vacuum is obtained.

(c) If a quick release of the vacuum brake is required, move the driver's brake valve handle to the OFF position and depress the trigger on the top of the handle.

(d) The application of the vacuum brake valve will give a proportional application of the air brake on the locomotive, but the air brake valve will NOT operate the vacuum brake.

When finished with the vacuum brakes after working vacuum fitted stock, the following procedure should be carried out before again moving the locomotive:-

(e) Place the vacuum brake valve to the ON position.

(f) Place the straight air brake valve to the ON position.

(g) Stop vacuum exhausters by placing the switch to the OFF position (only the second exhauster will stop on locomotives 4500-4502).

(h) Release vacuum from the chamber side by operating the release valve in the cab (except locomotives 4500-4502).

(i) When all vacuum is destroyed, return air brake valve to the RELEASE position, make an emergency application followed by a release and check that this is indicated on the air brake gauge.

2. Dual auto air braked locomotives.

(a) Place the exhauster isolating switch in the NORMAL position.

(b) Place the air/vacuum switch in the VACUUM position.

(c) Place the straight air brake valve in the OFF position and the driver's automatic air brake valve in the RUNNING position. Check that 21in. Hg of vacuum is created.

(d) If a quick release of the brakes is required move the driver's automatic brake valve to the RELEASE position and press the trigger on top of the brake valve.

(e) The application of the driver's automatic brake valve will give a proportional application of the air brake on the locomotive and control the vacuum brake on the train, but the straight air brake valve will NOT operate the vacuum brake.

When finished with the vacuum brakes after working vacuum braked stock the following procedure should be carried out before moving the locomotive:-

(f) Place the driver's automatic brake valve in the FULL SERVICE position.

(g) Hold the locomotive by making a brake application with the straight air brake valve.

(h) Move the exhauster isolating switch to the OFF position to stop the exhausters.

(i) Release the vacuum from the chamber side by operating the release valve in the cab.

(j) When all vacuum is destroyed return the straight air brake valve to the RELEASE position. Make an emergency application, followed by a release and check that the application and release is indicated by the brake cylinder pressure gauge.

3. When working air braked trains the following instructions apply (dual auto air braked locomotives):-

(a) Check that the exhauster isolating switch is in the OFF position.

(b) Place the air/vacuum switch in the AIR position. This will start the No. 2 compressor.

(c) Place the straight air brake valve in the OFF position and the driver's automatic air brake valve in the RUNNING position. Check that the air brake pipe is charged to 69-71 lbs./sq. in.

(d) After coupling the locomotive to the train the brake system must be tested in accordance with the instructions contained in the General Appendix (Supplement No. 2, March, 1968).

To fully charge the train brake pipe move the automatic driver's brake valve to the RELEASE position and hold it there whilst the brake pipe pressure rises to 76 lbs./sq. in. Hold the brake valve in the RELEASE position for not more than 15 seconds and return it to the RUNNING position. The brake pipe pressure will then steadily fall to 69-71 lbs./sq. in.

(e) The driver's automatic brake valve controls the air brakes on both the locomotive and the train. When making a brake application move the brake handle to the FIRST APPLICATION position. The air brake pipe pressure should fall to 63-65 lbs./sq. in. and the locomotive brake cylinder pressure will rise to 10-15 lbs./sq. in. Continue to move the brake valve towards the FULL SERVICE position until the required amount of braking is achieved. At the FULL SERVICE position the locomotive air brake pipe pressure will be about 48 lbs./sq. in. and the brake cylinder pressure will be 57-63 lbs./sq. in.

When releasing the brakes move the driver's automatic air brake valve handle the required amount towards the RUNNING position for a partial recharge of the air brake and into the RUNNING position to release the brakes and recharge the air brake pipe to 70 lbs./sq. in.

(f) If an emergency brake application is necessary move the driver's automatic air brake valve to the EMERGENCY position or pull the emergency brake valve handle sharply downwards. The air brake pipe pressure will fall rapidly to zero and the locomotive brake cylinder pressure will rise to 57-63 lbs./sq. in.

(g) The straight air brake valve will not operate the air brakes on the train.

At the completion of air braked train working carry out the following procedure:-

(h) Move the driver's automatic brake valve handle to the FULL SERVICE position.

(i) Move the straight air brake valve to the ON position.

(j) Move the air/vacuum switch to the LIGHT LOCO or VACUUM position as required.

(k) Test the straight air brake when the LIGHT LOCO position is selected by moving the straight air brake valve to the RELEASE position and then making an emergency application, followed by a release. Check that the application and release is indicated by the brake cylinder gauge.

When the VACUUM position is selected proceed as in 2 (2).

4. Emergency brake application (dual auto air braked locomotives).

 An emergency brake application can be made by using the combined air/vacuum emergency brake valve irrespective of the brake system in use.

STANDARD DISPOSAL DUTIES FOR DIESEL ELECTRIC SHUNTING LOCOMOTIVES

1. Stop the engine and apply the handbrake.
2. Move the straight air brake valve to the OFF position.
3. Check that the series/parallel switch (where provided) is in the parallel position.
4. Check the fuel levels in the main and service tank.

 Open battery isolating switch right hand side and blow down the air reservoir, same side.
5. Examine locomotive, brakes, etc., and engine room on the right hand side.
6. Proceed to left hand side and open left hand battery isolating switch. Examine locomotive, brakes, etc., on that side. Close radiator shutter and open left hand reservoir drain cocks.
7. Examine engine room, left hand side and check engine sump oil level.
8. Return to cab. Record the fuel readings (report when booking off if less than 100 gallons are left in the main tank).
 Remove the master switch handle.
 Switch off all lights.
9. Close windows and doors.

TOWING THE LOCOMOTIVE

1. In an emergency the locomotive may be towed up to a maximum speed of 10 m.p.h.
2. For towing (other than an emergency) the locomotive must be prepared by maintenance staff. The speed must NOT EXCEED 25 m.p.h., or a lower speed if specified by maintenance staff, at any time whilst towing.
3. If locomotives Nos. 4500-4502 are towed dead as fixed vehicles in vacuum braked trains the 2in. isolating cock adjacent to the D.S.D. vacuum emergency valve must be closed (fitted on master unit only). The pair of locomotives must then be towed as unbraked vehicles.

COOKER

An electric cooker is provided in the cab. It operates on a supply from the auxiliary generator and is available only when the master switch is in the ON position and the engine is running.

B.R.33003/252
July, 1969

BRITISH RAILWAYS

DIESEL ELECTRIC SHUNTING LOCOMOTIVES

Nos. 3000 - 4192
4500 - 4502
12033 - 12138
15211 - 15236

PART 3

FAULT FINDING DATA AND CHARTS

PART III

FAULT FINDING

The fault charts are intended as a guide to drivers to enable the readily diagnosed faults to be found and remedial action taken. As soon as it is discovered that a fault cannot be rectified the nearest depot should be advised for the arrangement of a substitute locomotive or attention by maintenance staff.

Care should be taken during preparation and any suspected faults attended to. At the end of each shift any faults found of the following nature must be included in the driver's repair book.

(a) Fuses changed.

(b) Water added to the cooling system.

(c) Isolating cocks closed (i.e. compressor governor isolating cock).

(d) Isolated filters.

(e) Earth switch opened.

These are in addition to any other defects which may be reported in the course of working.

EFFECT OF FUSES RUPTURING

Fuse	Effect of rupturing
Battery charging	Engine will not start or engine will not stop
Blower motor (where fitted) (EE only)	Blower motor will stop and locomotive will not move or power is suddenly lost
Compressor	Compressor will stop and locomotive will not move or is stopped
Control	Engine cannot be started or will stop suddenly
Cooker	Cooker inoperative
Exhauster (where fitted)	Exhauster(s) will stop
Generator field relay (EE only)	Locomotive speed will not increase when power controller is moved to notch 4
Lighting	Light inoperative
Maximum excitation relay (GEC only)	Locomotive speed will not increase when power controller is moved to notch 4

CHANGING FUSES

In the event of a fuse failure, a spare should be used. Care must be taken that an exactly similar fuse is fitted (check the letters and numbers and rating before inserting). The method of changing fuses is:-

1. Stop the engine.
2. Open the B.I.S.
3. Remove suspect fuse.
4. Fit replacement fuse.
5. Close B.I.S.
6. Re-start engine.

If a fuse tester is fitted test the suspect fuse by placing it across the tester contacts (which are live). If the fuse is in order the test lamp will illuminate and the fuse can be refitted.

CAUTION : DO NOT touch fuse tester terminals by hand.

DRIVING COMPARTMENT INSTRUMENT READINGS

Instrument	Reading		Action to be taken if incorrect readings are given
	Loco. standing	Loco. moving	
Battery volt meter nominal readings	80-90 volts or 90-110 volts	90 volts or 110 volts	Report any variation above maximum readings or below minimum readings.
Main generator ammeter	0	0-900 amps	The normal maximum current is 600 amps. Current may exceed 800 amps. during initial acceleration. At all other times current should not be allowed to exceed 600 amps.
Speedometer	0	0-20 m.p.h. or 0-27 m.p.h. (see Part I)	The maximum permitted speed must not be exceeded at any time under power or when coasting.
Engine cooling water temperature gauge	190°F. (max.)	190°F. (max.)	Check for faults as in Fault Chart No. 4
Engine lubricating oil pressure	20 p.s.i. (EE engine) 35-40 p.s.i. (Lister-Blackstone engine)	20 p.s.i. (EE engine) 35-40 p.s.i. (Lister-Blackstone engine)	The engine will shut down when oil pressure falls to: 10 p.s.i. (EE engine) 15 p.s.i. (Lister-Blackstone engine) Check for faults as in Fault Chart Nos. 2 or 3
Duplex air pressure	65-85 p.s.i. 85-100 p.s.i. (dual auto air braked locomotive)	65-85 p.s.i. 85-100 p.s.i.	
Air brake pipe pressure gauge	48-70 p.s.i.	48-70 p.s.i.	—
Duplex vacuum gauge	0-21" Hg (brake pipe) 21" Hg (reservoir)	21" Hg (brakepipe and reservoir)	—

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Main generator ammeter	0	0-900 amps	The normal maximum current is 600 amps. Current may exceed 800 amps. during initial acceleration. At all other times current should not be allowed to exceed 600 amps.
Speedometer	0	0-20 m.p.h. or 0-27 m.p.h. (see Part I)	The maximum permitted speed must not be exceeded at any time under power or when coasting.
Engine cooling water temperature gauge	190°F. (max.)	190°F. (max.)	Check for faults as in Fault Chart No. 4
Engine lubricating oil pressure	20 p.s.i. (EE engine) 35-40 p.s.i. (Lister-Blackstone engine)	20 p.s.i. (EE engine) 35-40 p.s.i. (Lister-Blackstone engine)	The engine will shut down when oil pressure falls to: 10 p.s.i. (EE engine) 15 p.s.i. (Lister-Blackstone engine) Check for faults as in Fault Chart Nos. 2 or 3
Duplex air pressure	65-85 p.s.i. 85-100 p.s.i. (dual auto air braked locomotive)	65-85 p.s.i. 85-100 p.s.i. (dual auto air braked locomotive)	
Air brake pipe pressure gauge	48-70 p.s.i.	48-70 p.s.i.	—
Duplex vacuum gauge	0-21" Hg (brake pipe) 21" Hg (reservoir)	21" Hg (brakepipe and reservoir)	—

ENGINE WILL NOT START

PROBABLE CAUSES

- Engine does not turn when master switch is turned to START position
 - Battery Isolating Switch open
 - Return master switch to OFF and close BIS
 - Control fuse defective
 - Change fuse
- Engine turns but does not fire or stops immediately after firing
 - Battery discharged
 - Request assistance
 - Fuel starvation
 - Check fuel level in service tank
 - Transfer fuel from main tank (If main fuel tank is empty request assistance)
 - Check fuel supply cock is open
 - Check engine hand emergency shut down handle is in the RUN position (English Electric engine only)
 - Check engine control lever is in the fully anti-clockwise position (Lister Blackstone engine only)
 - Fuel system air locked
 - Request assistance
 - Low lubricating oil pressure
 - Check oil level in engine sump
 - If low request assistance (High level may indicate fuel dilution. Fail locomotive)
 - 'Fram' filter leaking
 - Isolate filter and report
 - Dual filter blocked
 - Reverse handle on top of filter and report
 - Engine overspeed tripped (Lister Blackstone engine only)
 - Push lever up to reset overspeed device

ALL DEFECTS MUST BE REPORTED

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LOCOMOTIVE DOES NOT MOVE

PROBABLE CAUSES

- Master switch and reversing handle in the wrong position
 - Move to the correct position
- Emergency start switch in the wrong position
 - Return controller handle to OFF and shut down engine
 - Open BIS
 - Move emergency start switch to NORMAL position
 - Close BIS
- Traction motor blower stopped (motor driven type)
 - Change fuse
- Low air pressure (below 45 p.s.i.)
 - Allow air pressure to build up
 - Compressor stopped
 - Change fuse or check belts
 - If air pressure does not build up check that cocks on air reservoirs are closed
 - If necessary isolate compressor governor (report at earliest opportunity)
- Brakes applied
 - Check that hand and air brake are released
 - D.S.D. pedal not depressed
 - If brakes do not release when pedal is depressed fail the locomotive
 - Vacuum brakes on train not released
 - Exhauster(s) not running
 - Exhauster fuse(s) defective
 - Change fuse(s)
 - Check exhauster cut out switch
- Overload or earth fault relay tripped
 - Return power controller handle to notch 1 Notch up again slowly
 - If current rises rapidly and exceeds the maximum permitted the probable cause is:
 - (a) overload due to notching up too rapidly
 - (b) excessive load
 - (c) partial brake application
 - If relay operates at normal currents cause is earth fault
 - Return power controller to OFF and open BIS
 - Open earth switch in cubicle
 - Close BIS
 - Proceed normally and report at first opportunity
- Excessive trailing load
 - Reduce the load

ALL DEFECTS MUST BE REPORTED

POWER IS LOST

PROBABLE CAUSES

- **Engine stops**
 - Refer to Fault Sheet No. 1 and check the following symptoms: -
 - Fuel starvation
 - Control fuse defective
 - Low lubricating oil pressure
 - Engine speed tripped (Lister Blackstone engine only)
- **Engine does not stop**
 - **D.S.D. pedal accidently released**
 - Reset:
 - (a) Return power controller to OFF
 - (b) Depress D.S.D. pedal
 - (c) Make an emergency straight air brake application and release
 - **Loss of air pressure**
 - **Compressor stopped**
 - Change fuse
 - If compressor does not restart request assistance
 - Check belts
 - If belts are slipping or detached request assistance
 - **Air leaks**
 - Close air reservoir cocks
 - If still leaking request assistance
 - **Faulty compressor governor**
 - Close isolating cock
 - Repeat at earliest opportunity
 - **Blower motor stopped**
 - Change fuse
 - **Power lost at maximum current (Overload or earth fault relay tripped)**
 - Return power controller handle to Notch 1. Notch up again slowly
 - If current rises rapidly and exceeds maximum permitted the probable cause is:
 - (a) overload due to notching up too rapidly
 - (b) excessive load
 - (c) partial brake application
 - If relay operates at normal currents cause is earth fault
 - Return power controller to OFF and open BIS
 - Open earth switch in cubicle
 - Close BIS
 - Proceed normally and report at first opportunity

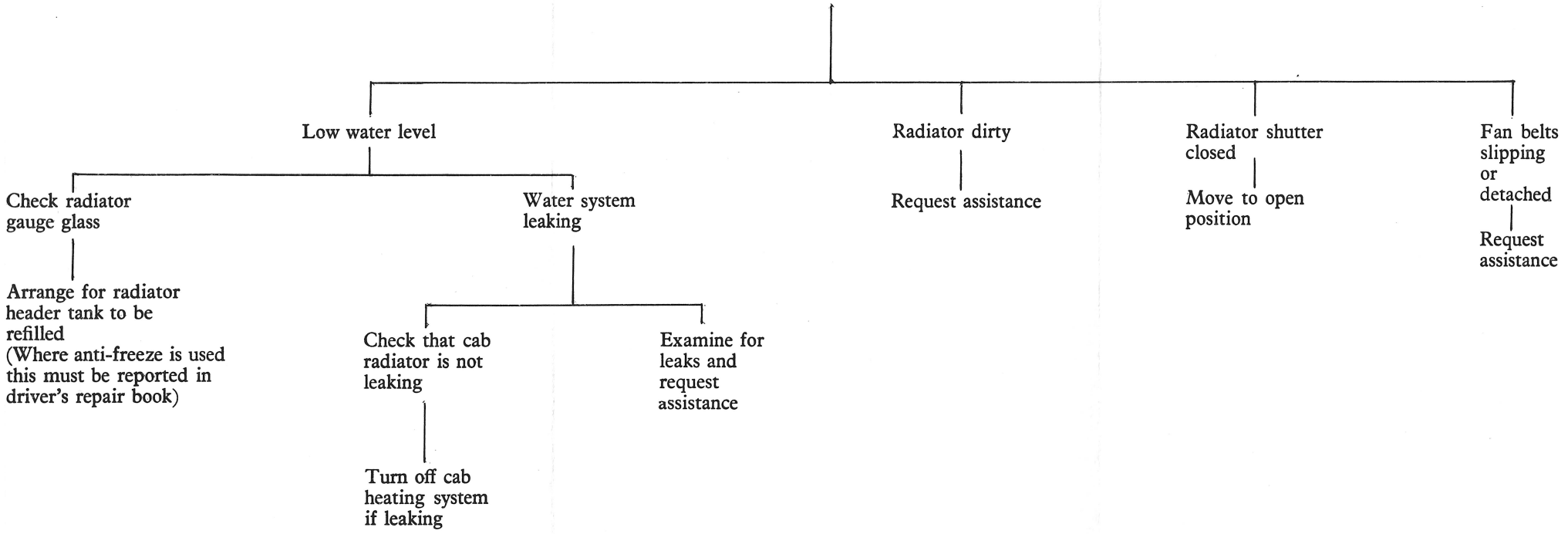
ALL DEFECTS MUST BE REPORTED

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June, 1968

HIGH ENGINE COOLING WATER TEMPERATURE

(above 190°F.)

PROBABLE CAUSES



ALL DEFECTS MUST BE REPORTED

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June, 1968